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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/327,469	06/08/1999	SHUNPEI YAMAZAKI	0756-1982	5465
31780	7590	08/10/2004	EXAMINER	
ERIC ROBINSON PMB 955 21010 SOUTHBANK ST. POTOMAC FALLS, VA 20165			PERALTA, GINETTE	
			ART UNIT	PAPER NUMBER
			2814	

DATE MAILED: 08/10/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

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<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	09/327,469	YAMAZAKI, SHUNPEI	
	<b>Examiner</b>	<b>Art Unit</b>	
	Ginette Peralta	2814	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 26 January 2004.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 2-13 and 20-23 is/are pending in the application.
- 4a) Of the above claim(s) 4 and 5 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 2,3,6-13 and 20-23 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                        | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. _____  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                                    |

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 2-3, and 20-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zhang et al. (U. S. Pat. 5,830,784) in view of Zhang et al. (U. S. Pat. 5,569,610) and Noguchi et al. (U. S. Pat. 5,869,803).

Zhang et al. ('784) discloses in figs. 3A to 3D a method of manufacturing a semiconductor device that comprises forming a semiconductor film 205 over a substrate, holding a catalytic element (col. 10, ll. 20-24) that promotes the crystallization of the semiconductor film in contact with the semiconductor film, irradiating a laser beam to the semiconductor film to crystallize the semiconductor film, patterning the semiconductor film to form at least a first semiconductor island after the irradiation of the laser beam and forming a first thin film transistor using the semiconductor island.

With regards to the limitation of forming a pixel matrix circuit comprising the first thin film transistor and forming a driver circuit comprising the second thin film transistor, this would not be given any patentable weight as it has been held that to be entitled to weight in method claims, the recited-structure limitations therein must affect the method in a manipulative sense, and not to amount to the mere claiming of a use of

a particular structure. *Ex parte Pfeiffer*, 1962 C.D. 408 (1961). Furthermore, the functional recitation of forming a portion of a pixel matrix comprising a first thin film transistor, and a portion of a driving circuit comprising a second thin film transistor has not been given patentable weight because it is narrative in form. In order to be given patentable weight, a functional recitation must be expressed as a "means" for performing the specified function, as set forth 35 U.S.C. 112, 6th paragraph, and must be supported by recitation in the claim of sufficient structure to warrant the presence of the functional language. *In re Fuller*, 1929 C.D. 172; 388 O.G. 279.

Zhang et al. ('784) discloses the claimed invention with the exception of holding the catalytic element in contact with an entire surface of the semiconductor film, the laser beam shaped in a rectangle or a square, and the irradiation area of the laser beam.

Zhang et al. ('610) teaches a method of manufacturing a semiconductor device that comprises forming a semiconductor film, holding a catalytic element which promotes the crystallization of the semiconductor film in contact with the entire surface of the semiconductor film (Fig. 5A), irradiating a laser beam; wherein the laser energy density of the laser beam is 200 to 500 mJ/cm<sup>2</sup> and is used for the disclosed intended purpose of promoting crystallization of an amorphous area (FIG. 5B); patterning the semiconductor film to form at least first and second semiconductor islands (Fig. 5C); forming a first thin film transistor using the first semiconductor island, and forming a second thin film transistor using the second semiconductor island (Fig. 5C); and forming a portion of a pixel matrix circuit comprising the first thin film transistor; and

forming a portion of a driving circuit comprising the second thin film transistor (Fig. 5E).

Noguchi et al. teaches a method of promoting crystallization of a silicon layer that includes a laser beam shaped as a square or rectangle as shown in Figs. 1 and 2, having an irradiation area of 36 cm<sup>2</sup> or more, and wherein the silicon substrate is irradiated for the disclosed intended purpose of promoting crystallization.

Thus, it would have been obvious to one of ordinary skill in the art to vary the ranges of the properties of the laser beam in order to obtain a faster crystallization or a more defined crystallization without any unexpected results; and to form a portion of a pixel matrix circuit using the first transistor, and a portion of a driving circuit using the second transistor as Zhang et al. ('610) teaches. Furthermore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use a laser apparatus with the capability of having an irradiation area of 10 cm<sup>2</sup> or more as there is no statement denoting the criticality of the irradiation area and it would have been obvious to one of ordinary skill in the art at the time the invention was made to use varying areas of irradiation in order to find the optimum area of irradiation. And furthermore as Noguchi et al. teaches that the use of this irradiation areas are well known in the art.

"In the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a prima facie case of obviousness exists. In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976); In re Woodruff, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990) (The prior art taught carbon monoxide concentrations of "about 1-5%" while the claim was limited to "more than 5%." The court held that "about 1-5%" allowed for concentrations slightly above 5% thus the ranges overlapped.)" (MPEP 2144.04)

3. Claims 6-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zhang et al. (U. S. Pat. 5,830,784) in view of Zhang et al. (U. S. Pat. 5,569,610), Otani et al. (JP 9312260A) and Noguchi et al. (U. S. Pat. 5,869,803).

Zhang et al. ('784) discloses in figs. 3A to 3D a method of manufacturing a semiconductor device that comprises forming a semiconductor film 205 over a substrate, holding a catalytic element (col. 10, ll. 20-24) that promotes the crystallization of the semiconductor film in contact with the semiconductor film, irradiating a laser beam to the semiconductor film to crystallize the semiconductor film, patterning the semiconductor film to form at least a first semiconductor island after the irradiation of the laser beam and forming a first thin film transistor using the semiconductor island.

With regards to the limitation of forming a pixel matrix circuit comprising the first thin film transistor and forming a driver circuit comprising the second thin film transistor, this would not be given any patentable weight as it has been held that to be entitled to weight in method claims, the recited-structure limitations therein must affect the method in a manipulative sense, and not to amount to the mere claiming of a use of a particular structure. *Ex parte Pfeiffer*, 1962 C.D. 408 (1961). Furthermore, the functional recitation of forming a portion of a pixel matrix comprising a first thin film transistor, and a portion of a driving circuit comprising a second thin film transistor has not been given patentable weight because it is narrative in form. In order to be given patentable weight, a functional recitation must be expressed as a "means" for performing the specified function, as set forth 35 U.S.C. 112, 6th paragraph, and must be supported by

recitation in the claim of sufficient structure to warrant the presence of the functional language. *In re Fuller*, 1929 C.D. 172; 388 O.G. 279.

Zhang et al. ('784) discloses the claimed invention with the exception of holding the catalytic element in contact with an entire surface of the semiconductor film; the laser beam shaped in a rectangle or a square; the irradiation area of the laser beam; a step of conducting a thermal oxide processing in an oxide atmosphere; and, gettering the catalytic element by the addition of phosphorus or boron or through the oxide layer, and disclosing the irradiation area, and laser energy density of the laser beam.

Zhang et al. ('610) teaches a method of manufacturing a semiconductor device that comprises forming a semiconductor film, holding a catalytic element which promotes the crystallization of the semiconductor film in contact with the entire surface of the semiconductor film (Fig. 5A), irradiating a laser beam; wherein the laser energy density of the laser beam is 200 to 500 mJ/cm<sup>2</sup> and is used for the disclosed intended purpose of promoting crystallization of an amorphous area (FIG. 5B); patterning the semiconductor film to form at least first and second semiconductor islands (Fig. 5C); forming a first thin film transistor using the first semiconductor island, and forming a second thin film transistor using the second semiconductor island (Fig. 5C); and forming a portion of a pixel matrix circuit comprising the first thin film transistor; and forming a portion of a driving circuit comprising the second thin film transistor (Fig. 5E).

Noguchi et al. teaches a method of promoting crystallization of a silicon layer that includes a laser beam shaped as a square or rectangle as shown in Figs. 1 and 2,

having an irradiation area of 36 cm<sup>2</sup> or more, and wherein the silicon substrate is irradiated for the disclosed intended purpose of promoting crystallization.

Thus, it would have been obvious to one of ordinary skill in the art to vary the ranges of the properties of the laser beam in order to obtain a faster crystallization or a more defined crystallization without any unexpected results; and to form a portion of a pixel matrix circuit using the first transistor, and a portion of a driving circuit using the second transistor as Zhang et al. ('610) teaches. Furthermore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use a laser apparatus with the capability of having an irradiation area of 10 cm<sup>2</sup> or more as there is no statement denoting the criticality of the irradiation area and it would have been obvious to one of ordinary skill in the art at the time the invention was made to use varying areas of irradiation in order to find the optimum area of irradiation. And furthermore as Noguchi et al. teaches that the use of this irradiation areas are well known in the art.

"In the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a prima facie case of obviousness exists. In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976); In re Woodruff, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990) (The prior art taught carbon monoxide concentrations of "about 1-5%" while the claim was limited to "more than 5%." The court held that "about 1-5%" allowed for concentrations slightly above 5% thus the ranges overlapped.)" (MPEP 2144.04)

Otani et al. teaches a method of manufacturing a semiconductor device that comprises a metal element film which promotes crystallization being introduced into an amorphous silicon, the silicon film is crystallized by a heat treatment, then a second heat treatment is performed in an oxidizing atmosphere and the metal element is



removed or reduced, then the thermal oxidation film is removed and a thermal oxidation film is formed on the surface of the silicon film for the disclosed intended purpose of promoting silicon crystallization.

Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to perform a thermal oxidation treatment as Otani et al. teaches for the removal of the crystallization promoting element, and that it would be an inherent result of the annealing after the doping with phosphorus or boron that the crystallization promoting element will go through a gettering process and will be removed from the crystallized silicon layer.

#### *Response to Arguments*

4. Applicant's arguments filed 11/25/02 have been fully considered but they are not persuasive.

Regarding Applicant's argument that neither of Zhang '784 nor Zhang '610 disclose a pixel matrix circuit or forming a TFT of a pixel matrix circuit, it is noted that Zhang et al. '610 discloses in col. 4, ll. 33-42 that the semiconductor islands formed are to be used in forming a portion of a pixel matrix circuit and a portion of a peripheral driving circuit

With regards to Applicant's argument that the feature of gettering the catalytic element to the added region by conducting a heat treatment to remove or reduce the catalytic element is not conventional, Applicant is directed to Wolf, *Silicon Processing for the VLSI Era, Volume 1*, where it is disclosed an example of gettering of gold atoms in silicon by phosphorus diffusion, where after the impurity is present in the substrate, a

phosphorus diffusion is performed for the disclosed intended purpose of gettering the gold by the well known mechanism of extrinsic gettering. Thus, extrinsic gettering of ions or impurities utilizing phosphorus, arsenic, boron and other dopants is well known to one of ordinary skill in the art.

### *Conclusion*

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ginette Peralta whose telephone number is (571) 272-1713. The examiner can normally be reached on Monday to Friday 8:00 AM- 5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on (571) 272-1705. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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PRIMARY EXAMINER